PATENT ABSTRACTS OF JAPAN

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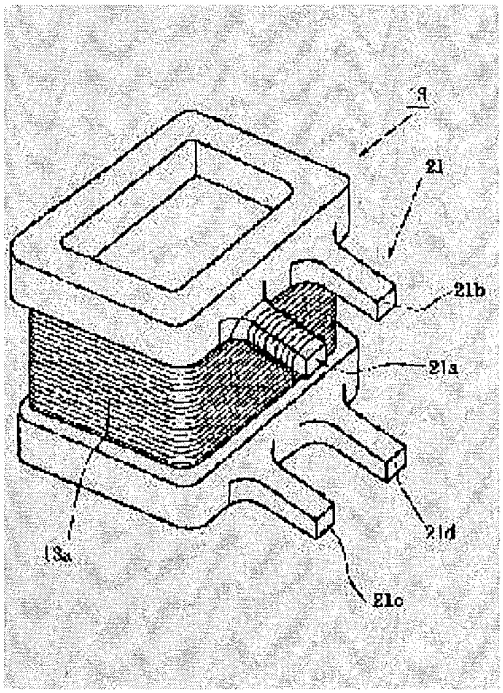
(54) BIAXIAL ACTUATOR AND ITS COIL BOBBIN

(57)Abstract:

PURPOSE: To provide a biaxial actuator and its coil bobbin in which a manufacturing cost is reduced and dynamic characteristics are improved by facilitating the assembling with simple constitution.

CONSTITUTION: This coil bobbin 13 for a biaxial actuator 10 is constituted so as to be mounted in a lens holder 12 of a biaxial actuator 10 and wound by a focusing coil and a tracking coil, two terminal pins 21 with its ends of lead wires of the coils wound respectively are brought into contact to corresponding contact points exposed to a lens holder side, and each terminal pins 21 are integrally formed with the coil bobbin by a molding material.



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CLAIMS

[Claim(s)]
[Claim 1] The coil bobbin which is a coil bobbin of the 2 shaft actuator which it is equip in the lens holder of a 2 shaft actuator , and the coil for focusing and the coil for tracking are wind , and is form upper limit and near the lower limit so that the contact surface to which two terminal pins by which the lead end-of-line end of each above-mentioned coil is tuck up , respectively correspond may be make to contact , respectively , and is characterize by to a coil bobbin and really be fabricate each above-mentioned terminal pin with the mold ingredient .
[Claim 2] Said terminal pin is a coil bobbin according to claim 1 characterized by forming the cross section in a rectangle.
[Claim 3] Said terminal pin is a coil bobbin according to claim 1 or 2 characterized by having expanded in a part for the root headquarters.
[Claim 4] Said terminal pin is a coil bobbin according to claim 1 to 3 characterized by being arranged upper limit and near a lower limit one of the coil winding sides of a coil bobbin.
[Claim 5] The coil bobbin according to claim 1 to 3 characterized by spacing of an upper terminal pin being large among said two terminal pins each, and setting up spacing of a downward terminal pin narrowly.
[Claim 6] The coil bobbin according to claim 1 or 2 with which each coil wound around said coil bobbin is characterized by being divided into the terminal pin of the upper part or a lower part, and connecting by the start [of a volume], and volume end, respectively.
[Claim 7] The coil bobbin according to claim 1 or 2 characterized by dividing the start of a volume into a downward terminal pin at the terminal pin of the upper part [end / volume], respectively, and connecting each coil wound around said coil bobbin.
[Claim 8] A coil bobbin given in claim 1 thru/or any of 4 they are. [which is characterized by connecting to the terminal pin of the same side each coil wound around said coil bobbin about right and left, respectively]
[Claim 9] A coil bobbin given in claim 1 thru/or any of 4 they are. [which is characterized by connecting each coil wound around said coil bobbin so that the terminal pin of the opposite side may be intersected about right and left, respectively]
[Claim 10] A coil bobbin given in claim 1 thru/or any of 6 they are. [to which the field in which the terminal pin of said coil bobbin is prepared is characterized by being set as the field of an objective lens and the opposite side about a lens holder]
[Claim 11] It has the suspension where the end fixed to the lens holder containing an objective lens and a coil bobbin, and this lens holder, and the other end was fixed to the fixed part. Upper limit and near a lower limit one of the coil winding sides of this coil bobbin Two terminal pins by which the lead end-of-line end of each above-mentioned coil is tucked up, respectively Are formed so that the corresponding contact surface exposed to the lens-holder side may be made to contact, respectively. So that it is a 2 shaft actuator, and each above-mentioned terminal pin may have a rectangular cross section in a coil bobbin and one with a mold ingredient and the amount of root headquarters may expand The 2 shaft

actuator characterized by being fabricated, and spacing of an upper terminal pin being comparatively large among two above-mentioned terminal pins each, and setting up spacing of a downward terminal pin comparatively narrowly.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the 2 shaft actuator and its coil bobbin for the optical pickup used in order to record or reproduce the signal of an information record medium.
[0002]
[Description of the Prior Art] Conventionally, such a 2 shaft actuator for optical pickup is used in order to record or reproduce the signal of a disk-like information record medium like an optical disk. And this 2 shaft actuator can move now the objective lens prepared in supporter material to 2 of the direction of focusing, and the direction of tracking directions.
[0003] Such a 2 shaft actuator is constituted as shown in drawing 7 . In drawing 7 , the 2 shaft actuator 1 has the coil bobbin 3 attached by adhesion etc., the suspension 4 which consists of spring materials, such as a flat spring which supports this lens holder 2 by the end, and which changes, and the attachment member 6 which carries out fixed maintenance of the other end of this suspension 4 at the fixed side of base section 5 grade to the lens holder 2 equipped with objective lens 2a, and this lens holder 2.
[0004] The above-mentioned lens holder 2 is supported by the above-mentioned suspension 4 movable to the base section 5 in perpendicular 2 directions of tracking, i.e., the direction shown with Sign Trk, and the direction of focusing shown with Sign Fcs.
[0005] Moreover, as for the above-mentioned coil bobbin 3, coil 3for focusing a and coil 3b for tracking are wound around the coil section, respectively. And to four terminal pins 7 prepared so that it might project in the method of both sides of this coil bobbin 3, the terminal of the coil of each coil is wound, respectively and is being fixed. In addition, as for the above-mentioned coil bobbin 3, the upper part is covered with covering 3c.
[0006] Here, the terminal pin 7 is formed by driving in and pressing a metal pin fit to the mold of a lens holder 2, and is arranged in the edge of the upper and lower sides of the coil bobbin 3 two [at a time].
[0007] On the other hand, within the lens holder 2, the inside edge of each suspension 4 is arranged so that it may expose in the location which can contact each terminal pin 7 of a coil bobbin. And as for each coils 3a and 3b, the end of the lead end of line is wound around the terminal pin 7, respectively.
[0008] Furthermore, the magnet 9 is attached in the medial surface of end 8a by the side of the fixed part of this York 8 while the edges 8a and 8b of York 8 attached in the fixed part 5 counter to each coils 3a and 3b.
[0009] Thus, according to the constituted 2 shaft actuator 1, this coil bobbin 3 is moved to each coils 3a and 3b from the exterior to Drawing Trk and the Fcs direction by supplying driver voltage. In this way, objective lens 2a attached in the lens holder 2 is suitably moved to the direction of focusing, and the direction of tracking.
[0010]
[Problem(s) to be Solved by the Invention] However, in the 2 shaft actuator 1 of such a configuration, it connects with a terminal pin by tucking up at the terminal pin 7 pressed fit in the coil bobbin 3, respectively the lead end-of-line end of each coils 3a and 3b of three bottles of KOIRUBO. For this

reason, in order to tuck up the lead end-of-line end of the both ends of each coils 3a and 3b, while four terminal pins 7 are required, it is necessary to press each terminal pin 7 fit to the coil bobbin 3, respectively, components mark increase, and assembly becomes complicated. Therefore, there was a problem that components cost and assembly cost will become high.
[0011] Moreover, in the part which presses the terminal pin 7 fit, the coil bobbin 3 fully needed to take flange thickness, in order to acquire sufficient mold rigidity which can be equal to press fit of the terminal pin 7. For this reason, there was a problem that a coil bobbin became thick and the cost of the mold ingredient of a coil bobbin became high.
[0012] Furthermore, since the terminal pin 7 is metal, the terminal pin 7 leads to the increment in weight of a lens holder 2 for which specific gravity size-comes and it goes as compared with the mold resin which constitutes the coil bobbin 3. Therefore, there was a problem that the dynamic characteristics of the 2 shaft actuator 1 was not not much good.
[0013] The terminal pin also had the problem of becoming expensive further again, from the copper terminal pin being used from it being desirable that it is nonmagnetic.
[0014] This invention aims at offering the 2 shaft actuator made it whose dynamic characteristics improve, and its coil bobbin while cost is reduced by that assembly is easy by the easy configuration in view of the above point.
[0015]
[Means for Solving the Problem] According to this invention, it is equipped with the above-mentioned purpose in the lens holder of a 2 shaft actuator. The coil for focusing and the coil for tracking are wound. The upper limit and near a lower limit Two terminal pins by which the lead end-of-line end of each above-mentioned coil is tucked up, respectively It is the coil bobbin of the 2 shaft actuator currently formed so that a corresponding contact surface may be made to contact, respectively, and is attained by the coil bobbin characterized by a coil bobbin and really fabricating each above-mentioned terminal pin with the mold ingredient.
[0016] The coil bobbin by this invention is desirable, and the cross section of said terminal pin is formed in the rectangle.
[0017] Said terminal pin has expanded the coil bobbin by this invention in a part for root headquarters preferably.
[0018] The coil bobbin by this invention is desirable, and said terminal pin is arranged upper limit and near a lower limit one of the coil winding sides of a coil bobbin.
[0019] Spacing of the terminal pin of the upper part among said two terminal pins each with the desirable coil bobbin by this invention is comparatively large, and spacing of a downward terminal pin is set up comparatively narrowly.
[0020] Preferably, a start [of a volume] and volume end is divided into the terminal pin of the upper part or a lower part, and, as for the coil bobbin by this invention, each coil wound around said coil bobbin is connected for it, respectively.
[0021] Preferably, the start of a volume is divided into a downward terminal pin at the terminal pin of the upper part [end / volume], respectively, and, as for the coil bobbin by this invention, each coil wound around said coil bobbin is connected.
[0022] Each coil with which the coil bobbin by this invention was preferably wound around said coil bobbin is connected to the terminal pin of the same side about right and left, respectively.
[0023] Preferably, the coil bobbin by this invention is connected so that each coil wound around said coil bobbin may intersect the terminal pin of the opposite side about right and left, respectively.
[0024] The coil bobbin by this invention is desirable, and the field in which the terminal pin of said coil bobbin is prepared is set as the field of an objective lens and the opposite side about the lens holder.
[0025] Moreover, the lens holder in which the above-mentioned purpose contains an objective lens and a coil bobbin according to this invention, It has the suspension where the end fixed to this lens holder, and the other end was fixed to the fixed part. Upper limit and near a lower limit one of the coil winding sides of this coil bobbin Two terminal pins by which the lead end-of-line end of each above-mentioned coil is tucked up, respectively Are formed so that the corresponding contact surface exposed to the lens-holder

side may be made to contact, respectively. So that it is a 2 shaft actuator, and each above-mentioned terminal pin may have a rectangular cross section in a coil bobbin and one with a mold ingredient and the amount of root headquarters may expand It is fabricated, and spacing of an upper terminal pin is comparatively large among two above-mentioned terminal pins each, and it is attained by the 2 shaft actuator characterized by setting up spacing of a downward terminal pin comparatively narrowly.
[0026]
[Function] According to the above-mentioned configuration, the terminal pin around which the coil terminal of each coil wound around the coil bobbin is wound is a coil bobbin and really formed. Thereby, in order to acquire the mold rigidity which can be equal to press fit, it is not necessary to form a coil bobbin thickly, while components mark are reduced and assembly becomes easy, since it is not necessary to press a metal pin fit as a terminal pin.
[0027] Moreover, since the terminal pin is fabricated from the same mold ingredient as a coil bobbin, while being nonmagnetic, specific gravity is light like a coil bobbin. Therefore, it is not necessary to arrange a terminal pin and the degree of freedom of a design becomes large in consideration of the weight balance of a 2 shaft actuator.
[0028] When the cross section of a terminal pin is formed in the rectangle, the lead terminal of each coil is tucked up around this terminal pin, and the corner of a terminal pin eats into this lead terminal, electrical installation may be performed certainly.
[0029] The terminal pin made of resin which is inferior by reinforcement compared with a metal pin seems furthermore, not to break by the tensile stress by that of a lead terminal, in case the rigidity over the force of the longitudinal direction of a terminal pin may be raised and the lead terminal of each coil is tucked up, when the amount of [of a terminal pin] root headquarters has expanded.
[0030] When said terminal pin is arranged upper limit and near a lower limit one of the coil winding sides of a coil bobbin, the width of face of a 2 shaft actuator will be more narrowly constituted by setting this coil winding side as the whole surface of the die-length direction of a 2 shaft actuator.
[0031] An upper terminal pin has comparatively large spacing, and when spacing is comparatively set up for the downward terminal pin narrowly, an up-and-down terminal pin does not lap about a perpendicular direction in the location corresponding to the contact exposed in a lens holder. Therefore, the contact which the coil bobbin was smoothly inserted into the lens holder as the contact in the lens holder corresponding to [in case a coil bobbin was perpendicularly inserted into a lens holder] an upper terminal pin did not hit the terminal pin of the lower part of a coil bobbin, and exposed up-and-down each terminal pin in the lens holder, respectively will be contacted, and it will connect electrically.
[0032] When dividing and connecting with the terminal pin of the upper part or a lower part, respectively, each coil wound around the coil bobbin [a start / of a volume /, and volume end] If an upper contact is formed in one of the first leadframe among each contact of a lens holder and the downward contact is formed in one of the second leadframe, by inserting a coil bobbin in a lens holder Each coil of this coil bobbin will be connected to the first leadframe and second leadframe which both ends mentioned above, respectively. Therefore, it is possible by impressing an electrical potential difference to this the first leadframe and second leadframe to pass a drive current in each coil.
[0033] Since the start of a volume when each coil wound around the coil bobbin is wound around a duplex for the start of a volume for fray prevention when it is divided at the terminal pin of the upper part [end / volume] at a downward terminal pin, respectively and connects will be located under the coil bobbin, the weight by the terminal pin of a coil bobbin will come together caudad.
[0034] Furthermore, since it connects so that the terminal pin of the same side or the terminal pin of the opposite side may be intersected about right and left, respectively, right-and-left exchange ****** is possible for each coil wound around the coil bobbin in the terminal pin which is only the upper limit or lower limit of a coil bobbin, and should be connected according to the configuration of a coil bobbin.
[0035]
[Example] Hereafter, the suitable example of this invention is explained to a detail, referring to drawing 1 thru/or drawing 6 . In addition, since the example described below is a suitable example of this invention, desirable various limitation is attached technically, but especially the range of this invention

is not restricted to these modes, as long as there is no publication of the purport which limits this invention in the following explanation.
[0036] Drawing 1 and drawing 2 show one example of the 2 shaft actuator by this invention. In these drawings, the 2 shaft actuator 10 has the coil bobbin 13 attached by adhesion etc., the suspension 14 which consists of the spring material which supports this lens holder 12 by the end, and the attachment member 16 which carries out fixed maintenance of the other end of this suspension 14 at the fixed side of base section 15 grade to the lens holder 12 in which an objective lens 11 is attached, and this lens holder 12.
[0037] The above-mentioned lens holder 12 is supported by the suspension 14 movable to the base section 15 in perpendicular 2 directions of tracking, i.e., the direction shown with Sign Trk, and the direction of focusing shown with Sign Fcs.
[0038] Moreover, as for the above-mentioned coil bobbin 13, coil 13for focusing a and coil 13b for tracking are wound around the coil section, respectively. And as shown in drawing 3 , to four terminal pins 21 prepared so that it might project in the fixed part side of this coil bobbin 13, the terminal of the coil of each coil is wound, respectively and is being fixed.
[0039] Here, like illustration, four of this terminal pin 21 are brought together in one field among the coil winding sides of the coil bobbin 13, and it is preferably arranged in the edge of the upper and lower sides of this coil bobbin 13 two [at a time]. Especially, in this example, magnitude of the cross direction of the 2 shaft actuator 10 can be made small by forming four terminal pins 21 in a lens holder and an opposite side altogether. In addition, when not taking into consideration magnitude of the cross direction of the 2 shaft actuator 10, the terminal pin 21 may be formed so that it may project in the side of the coil bobbin 13. Furthermore, if it is in the coil bobbin 13, the downward terminal pins 21c and 21d are arranged so that the upper terminal pins 21a and 21b may be located among the upper terminal pins 21a and 21b with the comparatively large and spacing and the comparatively narrow and spacing.
[0040] In addition, each terminal pin 21 is the same mold ingredient as the coil bobbin 13 and the ingredient which has desirable moderate rigidity and pewter thermal resistance, for example, commercial "SUMIKA supermarket, (trademark). It is really fabricated by LCP E5008" to this coil bobbin 13. And while that cross section is desirable and being formed in the rectangle, i.e., a rectangle, or the square, as for this terminal pin 21, a part for that root headquarters is formed so that it may curve and expand, as shown in a detail at drawing 4 .
[0041] On the other hand, within the lens holder 12, the inside edge of each suspension 14 is arranged so that it may expose in the location which can contact each terminal pins 21a, 21b, 21c, and 21d of a coil bobbin. And each coils 13a and 13b of both are wound for any whose starts of a volume are the downward terminal pins 21c and 21d being, and the end of a volume is wound around the upper terminal pins 21a and 21b.
[0042] In this case, start of volume 13a-1 of each coils 13a and 13b, 13b-1, end of volume 13a-2, and 13b-2 may be connected to "parallel" at the terminal pins 21c and 21d, and 21a and 21c, respectively, as shown in drawing 5 . moreover, start of volume 13a- of each coils 13a and 13b -- 1 and 13 -- b-1, end of volume 13a-2, and 13b-2 are shown in drawing 6 -- as -- respectively -- the terminal pins 21d and 21c, and 21a and 21c -- "-- you may cross, " carry out and connect.
[0043] In addition, the connection condition of the coils 13a and 13b in drawing 6 and drawing 7 If and the volume start of each coils 13a and 13b and a volume end are divided into the terminal pin of the upper part and a lower part Although you may be in what kind of connection condition, when the start of a volume is wound around the downward terminal pin, a center of gravity will come together under the coil bobbin 13 and the lens holder 12, and it is good in respect of the weight balance of the 2 shaft actuator 10.
[0044] Furthermore, the magnet 23 is attached in the medial surface of end 22a by the side of the fixed part of this York 225 while the edges 22a and 22b of York 22 attached in the fixed part 15 counter to each coils 13a and 13b, as shown in drawing 2 . In addition, as for the above-mentioned coil bobbin 13, the upper part is covered with covering 24.
[0045] In case the 2 shaft actuator 10 by this example is constituted as mentioned above and the coil

bobbin 13 is attached to a lens holder, the coil bobbin 13 Since the downward terminal pins 21c and 21d are arranged by central approach among the terminal pin 21, and the upper terminal pins 21a and 21b separate on both sides a little and are arranged in them It is smoothly inserted into a lens holder 12, and each terminal pins 21a, 21b, 1c, and 21d can contact easily the edge of the suspension 14 exposed in a lens holder 12, respectively.

[0046] The lens holder 12 equipped with the coil bobbin 13 Since the volume start of each coils 13a and 13b wound around the coil bobbin 13 and a volume end are divided and wound around the up-and-down terminal pins 21a, 21b, 21c, and 21d, respectively By impressing the electrical potential difference between the suspension 14 of the lower part of each lens holder 12, and the first leadframe 19, the check of coils, such as a continuity test of each coils 13a and 13b and measurement of the field to generate, may be performed on a production line.

[0047] Thus, according to the assembled 2 shaft actuator 10, this coil bobbin 13 is moved from the exterior to Drawing Trk and the Fcs direction through a suspension 14 and the terminal pin 21 by supplying driver voltage to each coils 13a and 13b. In this way, the objective lens 11 attached in the lens holder 12 is suitably moved to the direction of focusing, and the direction of tracking.

[0048] Thus, in the above-mentioned example, the terminal pin around which the coil terminal of each coil wound around the coil bobbin is wound is a coil bobbin and really formed. Therefore, while components mark are reduced and assembly becomes easy, in order to acquire the mold rigidity which can bear a coil bobbin at press fit, it is not necessary to form thickly. In this way, components cost, ingredient cost, and assembly cost will be reduced.

[0049] Moreover, a terminal pin is nonmagnetic and specific gravity is light. Therefore, it is not necessary to arrange a terminal pin and the degree of freedom of a design of a coil bobbin becomes large in consideration of the weight balance of a coil bobbin. When the cross section of a terminal pin is formed in the rectangle, and the corner of a terminal pin eats into this lead terminal, electrical installation may be performed certainly. Therefore, reliable coil wiring is attained.

[0050] A terminal pin seems furthermore, not to break, in case the same rigidity as the conventional metal terminal pin will be acquired and the lead terminal of each coil is tucked up, when the amount of [of a terminal pin] root headquarters has expanded.

[0051] The contact which the coil bobbin was smoothly inserted into the lens holder in case a coil bobbin was perpendicularly inserted into a lens holder, when the upper limit of 1 of a coil bobbin side face and a lower limit were equipped with the terminal pin, and exposed up-and-down each terminal pin in the lens holder, respectively will be contacted, and it will connect electrically.

[0052] Therefore, a coil bobbin will have unnecessary connection of the coil of each coil with which it will be simply assembled to a lens holder, and ** was also wound around the coil bobbin, and assembly cost will be reduced.

[0053] When the volume start of each coil wound around the coil bobbin and a volume end are divided and connected to the terminal pin of the upper part or a lower part, respectively If the upper contact of a lens holder is fabricated in a production process by one by the first leadframe, and the downward contact is formed in one of the second leadframe and a coil bobbin will be inserted in a lens holder It is possible to impress an electrical potential difference to this the first leadframe and second leadframe. By this, even if it is by passing a drive current in each coil of a coil bobbin in the middle of assembly, the check of the flow of each coil, the generating MAG, etc. may be performed.

[0054] When the start of a volume is divided into a downward terminal pin at the terminal pin of the upper part [end / volume], respectively and each coil wound around the coil bobbin is connected, the weight balance of a coil bobbin and a 2 shaft actuator becomes good. Furthermore, since it connects so that the terminal pin of the same side or the terminal pin of the opposite side may be intersected about right and left, respectively, right-and-left exchange ****** is possible for each coil wound around the coil bobbin in the terminal pin which should be connected about either the upper limit of a coil bobbin, or a lower limit according to the configuration of a coil bobbin. Therefore, the degree of freedom of a design will become large about processing of the lead terminal of each coil.

[0055] In addition, in the above-mentioned example, the terminal pin 21 of form [not only this but the

cross section / in the configuration of other arbitration, such as circular, an ellipse form, a hexagon, and an octagon,] is clear, although the cross section is formed in the rectangle.
[0056]
[Effect of the Invention] As stated above, while cost is reduced by the easy configuration according to assembly being easy, according to this invention, the 2 shaft actuator made it whose dynamic characteristics improve, and its coil bobbin can be offered by it.

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TECHNICAL FIELD

[Industrial Application] This invention relates to the 2 shaft actuator and its coil bobbin for the optical pickup used in order to record or reproduce the signal of an information record medium.

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PRIOR ART

[Description of the Prior Art] Conventionally, such a 2 shaft actuator for optical pickup is used in order to record or reproduce the signal of a disk-like information record medium like an optical disk. And this 2 shaft actuator can move now the objective lens prepared in supporter material to 2 of the direction of focusing, and the direction of tracking directions.

[0003] Such a 2 shaft actuator is constituted as shown in drawing 7 . In drawing 7 , the 2 shaft actuator 1 has the coil bobbin 3 attached by adhesion etc., the suspension 4 which consists of spring materials, such as a flat spring which supports this lens holder 2 by the end, and which changes, and the attachment member 6 which carries out fixed maintenance of the other end of this suspension 4 at the fixed side of base section 5 grade to the lens holder 2 equipped with objective lens 2a, and this lens holder 2.

[0004] The above-mentioned lens holder 2 is supported by the above-mentioned suspension 4 movable to the base section 5 in perpendicular 2 directions of tracking, i.e., the direction shown with Sign Trk, and the direction of focusing shown with Sign Fcs.

[0005] Moreover, as for the above-mentioned coil bobbin 3, coil 3for focusing a and coil 3b for tracking are wound around the coil section, respectively. And to four terminal pins 7 prepared so that it might project in the method of both sides of this coil bobbin 3, the terminal of the coil of each coil is wound, respectively and is being fixed. In addition, as for the above-mentioned coil bobbin 3, the upper part is covered with covering 3c.

[0006] Here, the terminal pin 7 is formed by driving in and pressing a metal pin fit to the mold of a lens holder 2, and is arranged in the edge of the upper and lower sides of the coil bobbin 3 two [at a time].

[0007] On the other hand, within the lens holder 2, the inside edge of each suspension 4 is arranged so that it may expose in the location which can contact each terminal pin 7 of a coil bobbin. And as for each coils 3a and 3b, the end of the Read end of line is wound around the terminal pin 7, respectively.

[0008] Furthermore, the magnet 9 is attached in the medial surface of end 8a by the side of the fixed part of this York 8 while the edges 8a and 8b of York 8 attached in the fixed part 5 counter to each coils 3a and 3b.

[0009] Thus, according to the constituted 2 shaft actuator 1, this coil bobbin 3 is moved to each coils 3a and 3b from the exterior to Drawing Trk and the Fcs direction by supplying driver voltage. In this way, objective lens 2a attached in the lens holder 2 is suitably moved to the direction of focusing, and the direction of tracking.

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EFFECT OF THE INVENTION

[Effect of the Invention] As stated above, while cost is reduced by the easy configuration according to assembly being easy, according to this invention, the 2 shaft actuator made it whose dynamic characteristics improve, and its coil bobbin can be offered by it.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in the 2 shaft actuator 1 of such a configuration, it connects with a terminal pin by tucking up at the terminal pin 7 pressed fit in the coil bobbin 3, respectively the lead end-of-line end of each coils 3a and 3b of three bottles of KOIRUBO. For this reason, in order to tuck up the lead end-of-line end of the both ends of each coils 3a and 3b, while four terminal pins 7 are required, it is necessary to press each terminal pin 7 fit to the coil bobbin 3, respectively, components mark increase, and assembly becomes complicated. Therefore, there was a problem that components cost and assembly cost will become high.
[0011] Moreover, in the part which presses the terminal pin 7 fit, the coil bobbin 3 fully needed to take flange thickness, in order to acquire sufficient mold rigidity which can be equal to press fit of the terminal pin 7. For this reason, there was a problem that a coil bobbin became thick and the cost of the mold ingredient of a coil bobbin became high.
[0012] Furthermore, since the terminal pin 7 is metal, the terminal pin 7 leads to the increment in weight of a lens holder 2 for which specific gravity size-comes and it goes as compared with the mold resin which constitutes the coil bobbin 3. Therefore, there was a problem that the dynamic characteristics of the 2 shaft actuator 1 was not not much good.
[0013] The terminal pin also had the problem of becoming expensive further again, from the copper terminal pin being used from it being desirable that it is nonmagnetic.
[0014] This invention aims at offering the 2 shaft actuator made it whose dynamic characteristics improve, and its coil bobbin while cost is reduced by that assembly is easy by the easy configuration in view of the above point.

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MEANS

[Means for Solving the Problem] According to this invention, it is equipped with the above-mentioned purpose in the lens holder of a 2 shaft actuator. The coil for focusing and the coil for tracking are wound. The upper limit and near a lower limit Two terminal pins by which the lead end-of-line end of each above-mentioned coil is tucked up, respectively It is the coil bobbin of the 2 shaft actuator currently formed so that a corresponding contact surface may be made to contact, respectively, and is attained by the coil bobbin characterized by a coil bobbin and really fabricating each above-mentioned terminal pin with the mold ingredient.
[0016] The coil bobbin by this invention is desirable, and the cross section of said terminal pin is formed in the rectangle.
[0017] Said terminal pin has expanded the coil bobbin by this invention in a part for root headquarters preferably.
[0018] The coil bobbin by this invention is desirable, and said terminal pin is arranged upper limit and near a lower limit one of the coil winding sides of a coil bobbin.
[0019] Spacing of the terminal pin of the upper part among said two terminal pins each with the desirable coil bobbin by this invention is comparatively large, and spacing of a downward terminal pin is set up comparatively narrowly.
[0020] Preferably, a start [of a volume] and volume end is divided into the terminal pin of the upper part or a lower part, and, as for the coil bobbin by this invention, each coil wound around said coil bobbin is connected for it, respectively.
[0021] Preferably, the start of a volume is divided into a downward terminal pin at the terminal pin of the upper part [end / volume], respectively, and, as for the coil bobbin by this invention, each coil wound around said coil bobbin is connected.
[0022] Each coil with which the coil bobbin by this invention was preferably wound around said coil bobbin is connected to the terminal pin of the same side about right and left, respectively.
[0023] Preferably, the coil bobbin by this invention is connected so that each coil wound around said coil bobbin may intersect the terminal pin of the opposite side about right and left, respectively.
[0024] The coil bobbin by this invention is desirable, and the field in which the terminal pin of said coil bobbin is prepared is set as the field of an objective lens and the opposite side about the lens holder.
[0025] Moreover, the lens holder in which the above-mentioned purpose contains an objective lens and a coil bobbin according to this invention, It has the suspension where the end fixed to this lens holder, and the other end was fixed to the fixed part. Upper limit and near a lower limit one of the coil winding sides of this coil bobbin Two terminal pins by which the lead end-of-line end of each above-mentioned coil is tucked up, respectively Are formed so that the corresponding contact surface exposed to the lens-holder side may be made to contact, respectively. So that it is a 2 shaft actuator, and each above-mentioned terminal pin may have a rectangular cross section in a coil bobbin and one with a mold ingredient and the amount of root headquarters may expand It is fabricated, and spacing of an upper terminal pin is comparatively large among two above-mentioned terminal pins each, and it is attained by the 2 shaft actuator characterized by setting up spacing of a downward terminal pin comparatively narrowly.

[Translation done.]

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OPERATION

[Function] According to the above-mentioned configuration, the terminal pin around which the coil terminal of each coil wound around the coil bobbin is wound is a coil bobbin and really formed. Thereby, in order to acquire the mold rigidity which can be equal to press fit, it is not necessary to form a coil bobbin thickly, while components mark are reduced and assembly becomes easy, since it is not necessary to press a metal pin fit as a terminal pin.
[0027] Moreover, since the terminal pin is fabricated from the same mold ingredient as a coil bobbin, while being nonmagnetic, specific gravity is light like a coil bobbin. Therefore, it is not necessary to arrange a terminal pin and the degree of freedom of a design becomes large in consideration of the weight balance of a 2 shaft actuator.
[0028] When the cross section of a terminal pin is formed in the rectangle, the Read terminal of each coil is tucked up around this terminal pin, and the corner of a terminal pin eats into this Read terminal, electrical installation may be performed certainly.
[0029] The terminal pin made of resin which is inferior by reinforcement compared with a metal pin seems furthermore, not to break by the tensile stress by that of a Read terminal, in case the rigidity over the force of the longitudinal direction of a terminal pin may be raised and the Read terminal of each coil is tucked up, when the amount of [of a terminal pin] root headquarters has expanded.
[0030] When said terminal pin is arranged upper limit and near a lower limit one of the coil winding sides of a coil bobbin, the width of face of a 2 shaft actuator will be more narrowly constituted by setting this coil winding side as the whole surface of the die-length direction of a 2 shaft actuator.
[0031] An upper terminal pin has comparatively large spacing, and when spacing is comparatively set up for the downward terminal pin narrowly, an up-and-down terminal pin does not lap about a perpendicular direction in the location corresponding to the contact exposed in a lens holder. Therefore, the contact which the coil bobbin was smoothly inserted into the lens holder as the contact in the lens holder corresponding to [in case a coil bobbin was perpendicularly inserted into a lens holder] an upper terminal pin did not hit the terminal pin of the lower part of a coil bobbin, and exposed up-and-down each terminal pin in the lens holder, respectively will be contacted, and it will connect electrically.
[0032] When each coil wound around the coil bobbin is divided into the terminal pin of the upper part or a lower part, respectively and the start [of a volume] and volume end is connected, the upper contact among each contact of a lens holder is the first leadframe. When it is formed in one and the downward contact is formed in one of the second leadframe, each coil of this coil bobbin will be connected to the first leadframe and second leadframe which both ends mentioned above, respectively by inserting a coil bobbin in a lens holder. Therefore, it is possible by impressing an electrical potential difference to this the first leadframe and second leadframe to pass a drive current in each coil.
[0033] Since the start of a volume when each coil wound around the coil bobbin is wound around a duplex for the start of a volume for fray prevention when it is divided at the terminal pin of the upper part [end / volume] at a downward terminal pin, respectively and connects will be located under the coil bobbin, the weight by the terminal pin of a coil bobbin will come together caudad.
[0034] Furthermore, since it connects so that the terminal pin of the same side or the terminal pin of the

opposite side may be intersected about right and left, respectively, right-and-left exchange ****** is possible for each coil wound around the coil bobbin in the terminal pin which is only the upper limit or lower limit of a coil bobbin, and should be connected according to the configuration of a coil bobbin.

[Translation done.]

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EXAMPLE

[Example] Hereafter, the suitable example of this invention is explained to a detail, referring to drawing 1 thru/or drawing 6 . In addition, since the example described below is a suitable example of this invention, desirable various limitation is attached technically, but especially the range of this invention is not restricted to these modes, as long as there is no publication of the purport which limits this invention in the following explanation.

[0036] Drawing 1 and drawing 2 show one example of the 2 shaft actuator by this invention. In these drawings, the 2 shaft actuator 10 has the coil bobbin 13 attached by adhesion etc., the suspension 14 which consists of the spring material which supports this lens holder 12 by the end, and the attachment member 16 which carries out fixed maintenance of the other end of this suspension 14 at the fixed side of base section 15 grade to the lens holder 12 in which an objective lens 11 is attached, and this lens holder 12.

[0037] The above-mentioned lens holder 12 is supported by the suspension 14 movable to the base section 15 in perpendicular 2 directions of tracking, i.e., the direction shown with Sign Trk, and the direction of focusing shown with Sign Fcs.

[0038] Moreover, as for the above-mentioned coil bobbin 13, coil 13for focusing a and coil 13b for tracking are wound around the coil section, respectively. And as shown in drawing 3 , to four terminal pins 21 prepared so that it might project in the fixed part side of this coil bobbin 13, the terminal of the coil of each coil is wound, respectively and is being fixed.

[0039] Here, like illustration, four of this terminal pin 21 are brought together in one field among the coil winding sides of the coil bobbin 13, and it is preferably arranged in the edge of the upper and lower sides of this coil bobbin 13 two [at a time]. Especially, in this example, magnitude of the cross direction of the 2 shaft actuator 10 can be made small by forming four terminal pins 21 in a lens holder and an opposite side altogether. In addition, when not taking into consideration magnitude of the cross direction of the 2 shaft actuator 10, the terminal pin 21 may be formed so that it may project in the side of the coil bobbin 13. Furthermore, if it is in the coil bobbin 13, the downward terminal pins 21c and 21d are arranged so that the upper terminal pins 21a and 21b may be located among the upper terminal pins 21a and 21b with the comparatively large and spacing and the comparatively narrow and spacing.

[0040] In addition, each terminal pin 21 is the same mold ingredient as the coil bobbin 13 and the ingredient which has desirable moderate rigidity and pewter thermal resistance, for example, commercial "SUMIKA supermarket, (trademark). It is really fabricated by LCP E5008" to this coil bobbin 13. And while that cross section is desirable and being formed in the rectangle, i.e., a rectangle, or the square, as for this terminal pin 21, a part for that root headquarters is formed so that it may curve and expand, as shown in a detail at drawing 4 .

[0041] On the other hand, within the lens holder 12, the inside edge of each suspension 14 is arranged so that it may expose in the location which can contact each terminal pins 21a, 21b, 21c, and 21d of a coil bobbin. And each coils 13a and 13b of both are wound for any whose starts of a volume are the downward terminal pins 21c and 21d being, and the end of a volume is wound around the upper terminal pins 21a and 21b.

[0042] In this case, start of volume 13a-1 of each coils 13a and 13b, 13b-1, end of volume 13a-2, and 13b-2 may be connected to "parallel" at the terminal pins 21c and 21d, and 21a and 21c, respectively, as shown in drawing 5 . moreover, start of volume 13a- of each coils 13a and 13b -- 1 and 13 -- b-1, end of volume 13a-2, and 13b-2 are shown in drawing 6 -- as -- respectively -- the terminal pins 21d and 21c, and 21a and 21c -- "-- you may cross, " carry out and connect.
[0043] In addition, the connection condition of the coils 13a and 13b in drawing 6 and drawing 7 If and the volume start of each coils 13a and 13b and a volume end are divided into the terminal pin of the upper part and a lower part Although you may be in what kind of connection condition, when the start of a volume is wound around the downward terminal pin, a center of gravity will come together under the coil bobbin 13 and the lens holder 12, and it is good in respect of the weight balance of the 2 shaft actuator 10.
[0044] Furthermore, the magnet 23 is attached in the medial surface of end 22a by the side of the fixed part of this York 225 while the edges 22a and 22b of York 22 attached in the fixed part 15 counter to each coils 13a and 13b, as shown in drawing 2 . In addition, as for the above-mentioned coil bobbin 13, the upper part is covered with covering 24.
[0045] In case the 2 shaft actuator 10 by this example is constituted as mentioned above and the coil bobbin 13 is attached to a lens holder, the coil bobbin 13 Since the downward terminal pins 21c and 21d are arranged by central approach among the terminal pin 21, and the upper terminal pins 21a and 21b separate on both sides a little and are arranged in them It is smoothly inserted into a lens holder 12, and each terminal pins 21a, 21b, 1c, and 21d can contact easily the edge of the suspension 14 exposed in a lens holder 12, respectively.
[0046] The lens holder 12 equipped with the coil bobbin 13 Since the volume start of each coils 13a and 13b wound around the coil bobbin 13 and a volume end are divided and wound around the up-and-down terminal pins 21a, 21b, 21c, and 21d, respectively By impressing the electrical potential difference between the suspension 14 of the lower part of each lens holder 12, and the first leadframe 19, the check of coils, such as a continuity test of each coils 13a and 13b and measurement of the field to generate, may be performed on a production line.
[0047] Thus, according to the assembled 2 shaft actuator 10, this coil bobbin 13 is moved from the exterior to Drawing Trk and the Fcs direction through a suspension 14 and the terminal pin 21 by supplying driver voltage to each coils 13a and 13b. In this way, the objective lens 11 attached in the lens holder 12 is suitably moved to the direction of focusing, and the direction of tracking.
[0048] Thus, in the above-mentioned example, the terminal pin around which the coil terminal of each coil wound around the coil bobbin is wound is a coil bobbin and really formed. Therefore, while components mark are reduced and assembly becomes easy, in order to acquire the mold rigidity which can bear a coil bobbin at press fit, it is not necessary to form thickly. In this way, components cost, ingredient cost, and assembly cost will be reduced.
[0049] Moreover, a terminal pin is nonmagnetic and specific gravity is light. Therefore, it is not necessary to arrange a terminal pin and the degree of freedom of a design of a coil bobbin becomes large in consideration of the weight balance of a coil bobbin. When the cross section of a terminal pin is formed in the rectangle, and the corner of a terminal pin eats into this Read terminal, electrical installation may be performed certainly. Therefore, reliable coil wiring is attained.
[0050] A terminal pin seems furthermore, not to break, in case the same rigidity as the conventional metal terminal pin will be acquired and the Read terminal of each coil is tucked up, when the amount of [of a terminal pin] root headquarters has expanded.
[0051] The contact which the coil bobbin was smoothly inserted into the lens holder in case a coil bobbin was perpendicularly inserted into a lens holder, when the upper limit of 1 of a coil bobbin side face and a lower limit were equipped with the terminal pin, and exposed up-and-down each terminal pin in the lens holder, respectively will be contacted, and it will connect electrically.
[0052] Therefore, a coil bobbin will have unnecessary connection of the coil of each coil with which it will be simply assembled to a lens holder, and ** was also wound around the coil bobbin, and assembly cost will be reduced.

[0053] When the volume start of each coil wound around the coil bobbin and a volume end are divided and connected to the terminal pin of the upper part or a lower part, respectively If the upper contact of a lens holder is fabricated in a production process by one by the first leadframe, and the downward contact is formed in one of the second leadframe and a coil bobbin will be inserted in a lens holder It is possible to impress an electrical potential difference to this the first leadframe and second leadframe. By this, even if it is by passing a drive current in each coil of a coil bobbin in the middle of assembly, the check of the flow of each coil, the generating MAG, etc. may be performed.
[0054] When the start of a volume is divided into a downward terminal pin at the terminal pin of the upper part [end / volume], respectively and each coil wound around the coil bobbin is connected, the weight balance of a coil bobbin and a 2 shaft actuator becomes good. Furthermore, since it connects so that the terminal pin of the same side or the terminal pin of the opposite side may be intersected about right and left, respectively, right-and-left exchange ****** is possible for each coil wound around the coil bobbin in the terminal pin which should be connected about either the upper limit of a coil bobbin, or a lower limit according to the configuration of a coil bobbin. Therefore, the degree of freedom of a design will become large about processing of the Read terminal of each coil.
[0055] In addition, in the above-mentioned example, the terminal pin 21 of form [not only this but the cross section / in the configuration of other arbitration, such as circular, an ellipse form, a hexagon, and an octagon,] is clear, although the cross section is formed in the rectangle.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the outline perspective view showing one example of the 2 shaft actuator by this invention.
[Drawing 2] It is the decomposition perspective view of the 2 shaft actuator of drawing 1 .
[Drawing 3] It is the perspective view of the coil bobbin in the 2 shaft actuator of drawing 1 .
[Drawing 4] It is the expansion perspective view of the terminal pin of the coil bobbin of drawing 3 .
[Drawing 5] It is the schematic diagram showing the first example of the connecting arrangement of the terminal pin of the coil bobbin of drawing 3 .
[Drawing 6] It is the schematic diagram showing the second example of the connecting arrangement of the terminal pin of the coil bobbin of drawing 3 .
[Drawing 7] It is the decomposition perspective view showing an example of the conventional 2 shaft actuator.
[Description of Notations]
10 2 Shaft Actuator
11 Objective Lens
12 Lens Holder
13 Coil Bobbin
14 Suspension
15 Fixed Part
16 Attachment Member
17 Up Assembly
18 Lower Assembly
21 Terminal Pin
22 York
23 Magnet
24 Covering

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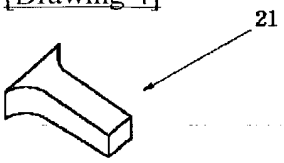
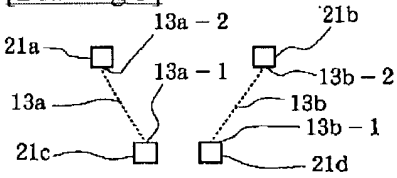
DRAWINGS

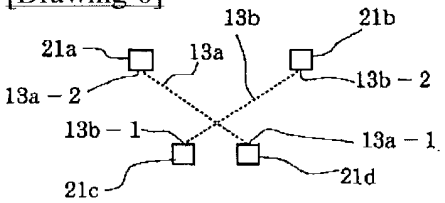
[Drawing 4]



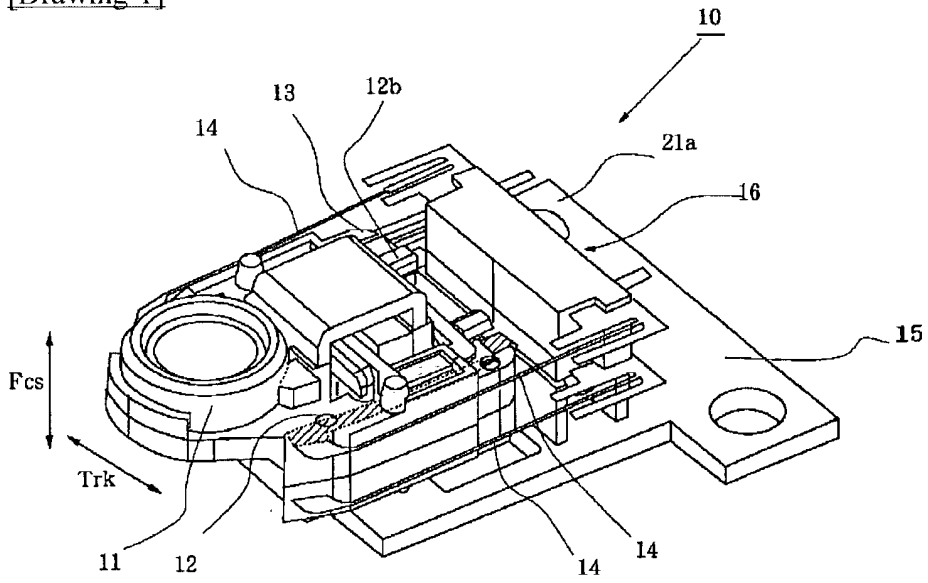
[Drawing 5]



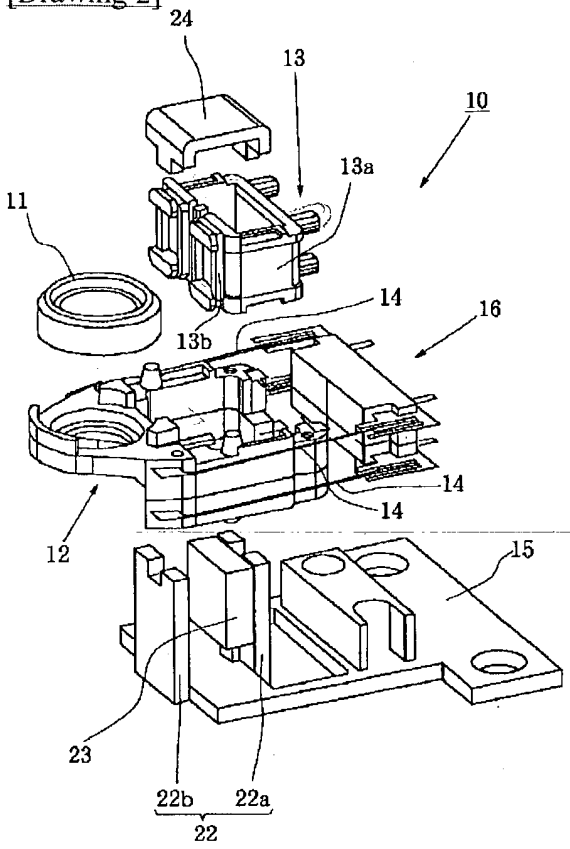
[Drawing 6]



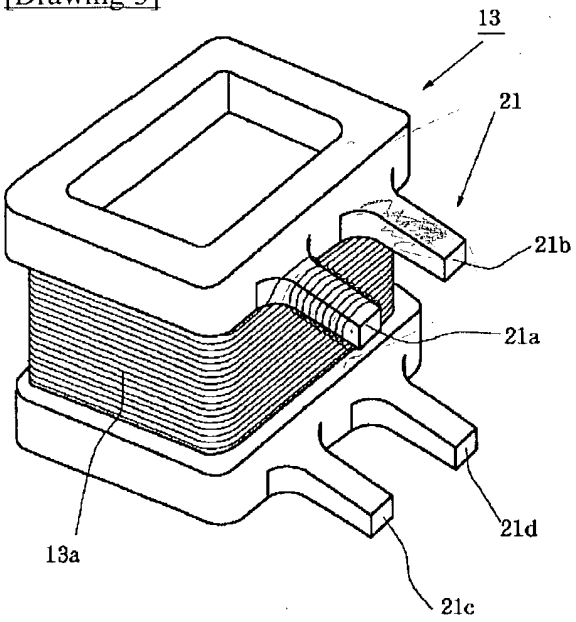
[Drawing 1]



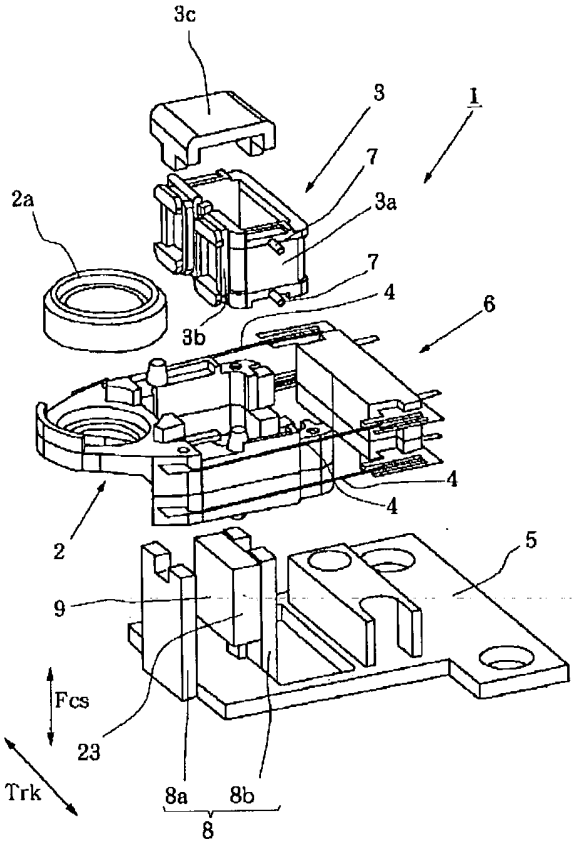
[Drawing 2]



[Drawing 3]



[Drawing 7]



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